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GEM PROPOSAL SUMMARY PAGE

(To be filled in by proposer)

Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska

Project Period: FY 04-FY 06

Proposer(s):

William R. Bechtol, Alaska Department of Fish and Game

Study Location: Kachemak Bay, Cook Inlet

Abstract:

This project will refine long-term monitoring of forage species populations in Cook Inlet, an area representative of ecosystem conditions and changes in the northern Gulf of Alaska. Finfish and shellfish will be sampled annually in May with a small-mesh, bottom trawl to determine whether competitive and predatory interactions or different responses to the environment may be favoring the abundance of one species over another. Project funding includes mounting a thermosalingraph on the survey platform to collect surface temperature and salinity data during all fieldwork conducted by the survey vessel throughout the calendar year. Products will include annual reports, presentations at scientific meetings, and a manuscript submission to a peer-reviewed journal. Project data will be also made available to other researchers to facilitate broader ecosystem modeling for the Gulf of Alaska. The study will incorporate community outreach and education involving local science classes in the collection of field data.

Funding:				
	EVOS Funding Requested:	FY 04	$ 51.1	
		FY 05	$ 49.2	
		FY 06	$ 51.1	TOTAL: $ 151.4
	Non-EVOS Funds to be Used:	FY 04	$ 20.8	
		FY 05	$ 21.1	
		FY 06	$ 21.6	TOTAL: $ 64.4

Date: June 15, 2003

(NOT TO EXCEED ONE PAGE)

GEM RESEARCH PLAN

Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska

I. NEED FOR THE PROJECT

A. Statement of Problem

The ecosystem structure in the northern Gulf of Alaska, as indicated by the dominant fish and predator populations, exhibited a significant shift in the late 1970s and early 1980s, likely triggered by a decadal shift in climate (Figure 1; Piatt and Anderson 1996; Bechtol 1997; Anderson et al. 1997). Abundances of many apex populations, particularly piscivores at or near the top of the marine food chain, declined in the Gulf of Alaska from the 1970s through the 1990s. At the same time, the gulf exhibited a drastic change in the type and abundance of forage species, such as herring, capelin, sand lance, shrimp, pollock and cod. Warming waters likely resulted in a shift from a crustacean-dominated forage population to a population dominated by fish, particularly gadid species such as pollock and cod. Small-mesh trawl surveys, conducted in Kachemak Bay in lower Cook Inlet since 1971, have produced a strong database to document these changes (Figure 1). Coupling trawl survey data with information on apex populations will allow scientists identify ecosystem links with the ultimate goals to improve: (1) monitoring of ecosystem changes; (2) identification of species or resources that are at risk; and (3) management of human use to reduce impacts on species at risk. A variety of presentations and manuscripts have already resulted from related projects since FY96.

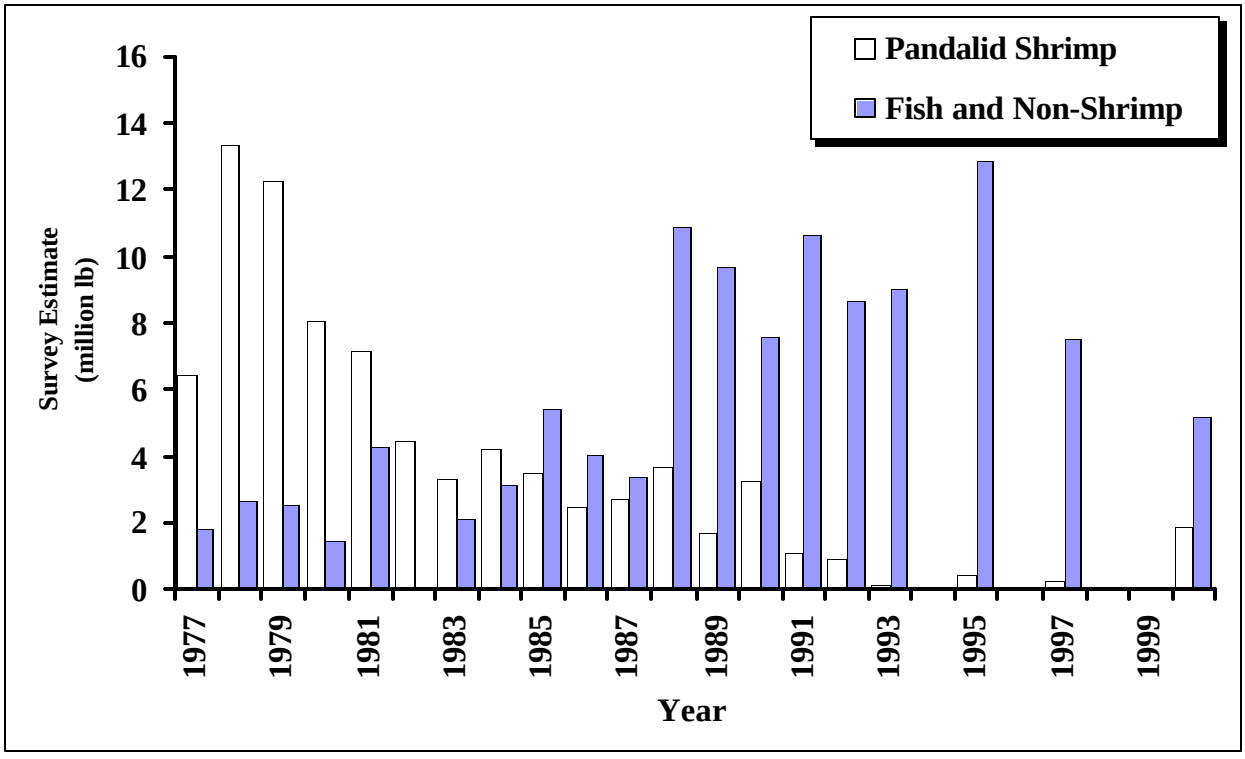

Figure 1. Small-mesh trawl survey catches from Kachemak Bay, Alaska, 1997-2000.

Fish, seabird, and marine mammal resources and services were injured by the 1989 *Exxon Valdez* oil spill. The oil spill also followed, and possibly exacerbated, a massive shift in ecosystem structure, likely related to a shift in climate and water temperatures. Concurrent with these changes, human use of natural resources has intensified in the oil spill area. Over half of the state's permanent residents live within the geographic area of the northern Gulf of Alaska and most of the state's one million tourists visit this region annually. Alaska's private sector economy depends heavily on natural resources in this region, and increasing tourism and recreational use, as well as increased commercial and sport fishing pressure, are all human activities that could affect the marine resources and ecosystem of the northern Gulf of Alaska. Human use demands for natural resources, particularly in the Cook Inlet area, can be expected to continue to increase in the future. In order to manage for optimum patterns and levels of human use, it is important to understand how ecosystem links are restructured following major perturbations, particularly how ecosystem productivity is influenced by natural changes and human activities. Critical to this understanding is long-term monitoring of a wide variety of ecosystem parameters and evaluation links among those parameters.

Standardized small-mesh trawl surveys have been conducted by the Alaska Department of Fish and Game in Kachemak Bay area since 1971. These surveys were conducted from one to three times annually as a means of assessing pink shrimp populations (*Pandalus borealis*). However, the commercial fishery has remained closed since 1986 due to a collapse of the shrimp population, and it cannot be determined when, if ever, this fishery will be reopened. The recreational shrimp fisheries have been closed since 1997. Given the shrimp decline, compounded by a declining department operating budget amid increasing demands for assessment and management of other resources, the Kachemak Bay small-mesh trawl survey was reduced to a biennial and then a triennial survey frequency. This survey has become a low department priority due to having limited direct utility for species such as Tanner crab that are actively managed by ADF&G at present. ADF&G recognizes this survey as an ecosystem monitoring tool of utility to a variety of agencies, particularly if links can be established among ecosystem components in ways that allow a priori estimation of ecosystem changes. The department developed standardized techniques for small-mesh trawl surveys to assess pandalid shrimp, but no longer views this survey as a priority agency responsibility. This project is needed to provide the data for long-term monitoring of ecosystem health in the northern Gulf of Alaska. In addition to conducting this survey to monitor changes in the composition and distribution of species captured by the small-mesh, bottom trawl, the data collected will be substantially enhanced by incorporating a thremosalinograph into the survey platform. This project will complement other studies of the northern Gulf of Alaska ecosystem by providing basis and comprehensive data on fish and crustacean population in the Lower Cook Inlet area.

This project also has potential for improving long-term monitoring and management of fish and marine mammal resources within the spill area and statewide. Improved resource monitoring will enable more effective evaluation of temporal variations in marine ecosystem components. It will also facilitate improved in-season management of fisheries, which will help restore sport, commercial, and subsistence fishing services injured by the oil spill.

B. Relevance to GEM Program Goals and Scientific Priorities

The proposed work directly addresses the objectives for studying the Nearshore as put forth in the RFP guidance documentation and GEM Science Plan. By virtue of continuing a long time series, with increased temporal resolution, this study further measures some of the variables needed to develop a whole-ecosystem model as described under the Modeling category identified in the RFP guidance documentation and GEM Science Plan. Additionally, the spring timing of the proposed fieldwork allows the study to incorporate Community Involvement and public awareness into the project. This occurs through inclusion of local high school and college classes, as well as staff from other resource management agencies, in the field collection of scientific data.

The expected results include three years of ecosystem composition data to complement the long-term data series for Cook Inlet and Kachemak Bay. The data will provide the data to support ecosystem models being developed for the region. Furthermore, the fieldwork involves both community members and staff from other agencies in a hands-on effort of the sampling program, resulting in increased awareness and ownership of the Gulf of Alaska marine resources.

II. PROJECT DESIGN

A. Objectives

The null hypothesis is that spring estimates of fish species composition, abundance, and biomass are consistent among years. Collection and analyses of survey data with small-mesh trawl survey will reveal whether changes have occurred.

To be able to test the above hypothesis we are proposing to address the following objectives:

1) Use a small-mesh bottom trawl to collect finfish and crustacean data in order to monitor and detect annual and long-term changes in the marine ecosystem along the northern Gulf of Alaska
2) Compare marine population data to examine ecosystem changes among years.
3) Work with other researchers in ecosystem modeling activities and to clarify links and temporal effects among ecosystem components.

B. Procedural and Scientific Methods

Vessel, Gear, and Trawling Procedures

The state research vessel *Pandalus* will conduct the trawl shrimp surveys in the spring of each year. The *Pandalus* has an overall length of 66 feet (20.2 m), a 100-ton displacement, and is powered by a 365-hp diesel engine. The vessel will fish a high-rise shrimp trawl designed by the National Marine Fisheries Service (NMFS; Davis 1982). The net has a 61-foot headrope and is rigged with 5.5-feet x 8.5-feet, 800-lb, Astoria V-doors attached by triple 10-fathom, 3/8-inch

diameter wire bridles (dandy lines). The dandy lines attach to the net headrope with a 24-inch extension chain, to the mid-rib with an 18-inch extension chain, and to the footrope by hammerlocks. The net has 55 feet of 3/8-inch tickler chain attached to the footrope wing tips and suspended under the footrope center by a 4 foot piece of 5/16-inch dropper chain. Sixty-one feet of 3/8-inch height regulating chain connects to the wing tips and is suspended 12 inches under the footrope by six 5/16-inch dropper chains. The whole net, wing, intermediate, and cod end is built with 1.25-inch stretch mesh nylon and the cod end also covered with polypropylene chafing mesh. Twenty-nine 8-inch plastic floats were attached to the head rope for flotation. Estimated fishing width is 32 feet and height is 11.5 feet (Watson 1987). Tows were made for 1 nmi and at a speed of 2.0-2.2 nmi/hr (kts) on a path into the tide. Trawl warp lengths were set at a 3:1 ratio with depth.

Bottom temperature at depth will be recorded approximately once daily with a time-specific temperature-depth logger attached to the trawl headrope. This temperature logger is typically attached on a tow where the likelihood of gear loss or a bottom hang-up is thought to be minor.

Catch Sampling

Upon completion of each successful tow, the total catch will be weighed and all large non-shrimp objects such as rocks, stumps, and crab pots removed from the catch, weighed, and discarded. All Pacific halibut *Hippoglossus stenolepis*, target groundfish, and target invertebrates will be removed, counted, and weighed in aggregate by species. Target groundfish include Pacific cod, walleye pollock, sablefish *Anoplopoma fimbria*, skate Family Rajidae, giant wrymouth *Delolepis gigantea*, and rockfish species *Sebastes* species; target invertebrates included Tanner crab *Chionoecetes bairdi*, red king crab *Paralithodes camtschatica*, Dungeness crab *Cancer magister*, weathervane scallop *Patinopecten caurinus*, and octopus *Octopus dofleini*. Pacific cod, walleye pollock, sablefish, and rockfish species will be further sampled for individual weight, length, sex, maturity, and age. The remaining catch will be either sorted in its entirety or a random subsample of up to three 1-bushel baskets, weighing approximately 50 lb (23 kg each), sorted into species or taxonomic groups. Abundance and aggregate weight will be determined for each non-shrimp species or taxonomic group from the subsample. Shrimp separated from the bushel samples will be sorted, weighed, and counted by species or weighed in aggregate and further subsampled. This involves sorting a 2.5-kg subsample by shrimp species. Each species will be weighed separately for species composition. In addition, up to 400 g of each shrimp species from the subsample will be labeled and retained for later length frequency analysis in the laboratory.

C. Data Analysis and Statistical Methods

For this analysis, field data sheets will be processed into an electronic database format that is consistent with ongoing data synthesis projects (Paul Anderson, National Marine Fisheries Service, Kodiak, AK, personal comunication). All catch data will be converted to 1.0 nm equivalents and summarized by tow. General fish catch will be converted to kg/nm and percent catch composition.

A stratified index estimator (Cochran 1977) will be used to estimate shrimp and fish biomass. Kachemak Bay will be divided into four strata: Far West, Near West, East Open, and East Closed (Figure 2; Gustafson 1994). This stratification is based on habitat type, geographic location, and previous observed species catch compositions (Davis 1982; Gustafson 1994). The Far West stratum historically contained few shrimp. The Near West stratum catch contained relatively sparse densities predominately of large female shrimp. The East Open stratum contained moderate densities of both shrimp sexes. The East Closed stratum, which was historically closed to trawl fishing, appeared to be a nursery area mostly containing male shrimp. Index stations in the East Closed, East Open, and Near West strata will be sampled with 1.0-nmi tows, whereas 0.5-nmi tows will be made in the Far West stratum to reduce potential net damage and complete the survey in a timely manner. Location and depth of trawl tows will be similar to historical survey efforts (Figure 2; Gustafson and Bechtol 2001).

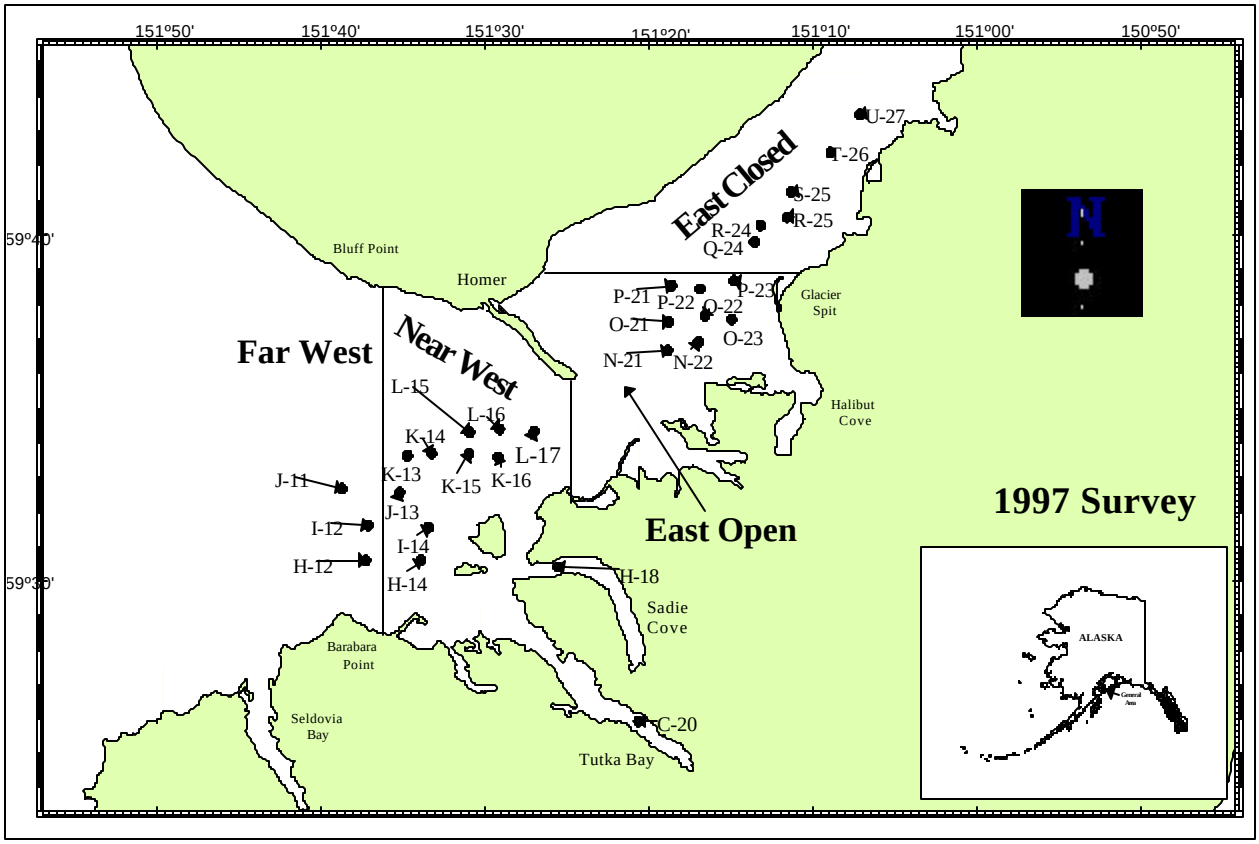

Figure 2. Midpoints of tows in a 1997 survey as an example of the proposed survey area coverage and stratification for a small-mesh bottom trawl survey of Kachemak Bay.

In the laboratory, shrimp will be measured for carapace length (Butler1980). Pink shrimp were further assessed as male, transitional, female, or ovigerous female sex type based on characteristics of the first and second pleopods (Butler 1980). Size data were pooled within species and also within sex category for pink shrimp. Also in the laboratory, otoliths from targets groundfish will be processed and aged (Committee of Age Reading Experts 2000).

Data Analysis

Mean catch rates of shrimp or fish species (lb/nmi) will be estimated by:

$$\bar{x} = \frac{\sum_{j=1}^{n} \frac{x_j}{d_j}}{n} \quad , \qquad (1)$$

where n is the number of tows sampled, x_j is the catch of tow j and d_j is the distance sampled.

Stratification of the historic population data reduces the percent error in the shrimp estimates. However, stratification has not historically improved statistical precision of the fish estimates. Therefore both stratified and unstratified biomass index estimates will be calculated.

Biomass (P) for the unstratified sample design is estimated by:

$$\hat{P} = A \ \frac{6076}{32} \ \bar{x} \quad , \qquad (2)$$

where the total area (A) in the study is 90 nmi^2, 6,076 is the length of a nautical mile in feet, and 32 is the effective net width in feet.

The variance of the biomass estimate for the unstratified design ($V\left(\hat{P}\right)$) is estimated by,

$$V\left(\hat{P}\right) = \left(\frac{6076}{32}\right)^2 s^2 \quad , \qquad (3)$$

where,

$$s^2 = \frac{\sum_{j=1}^{n} \left(x_j - \bar{x}\right)^2}{n-1} \quad .$$

Ninety-five percent confidence bounds for the unstratified biomass estimate are calculated as:

$$\hat{P} \pm t_{(1-\alpha/2, n-1)} SE \quad ,$$

where *SE* (standard error) is the square root of the sample variance.

Biomass (P_s) for the stratified sample design is estimated by:

$$\hat{P}_S = \left(6076/32\right) \sum_{i=1}^{4} A_i \frac{\sum_{j=1}^{n_i} \frac{x_{ij}}{d_{ij}}}{n_i} \quad , \tag{4}$$

where A_i is the area of stratum i in nmi^2, and x_{ij} is the catch (lb) and d_{ij} is the tow distance (nmi) of the $j^{\underline{th}}$ tow in stratum i.

The variance of the biomass estimate for the stratified design ($V\left(\hat{P}_S\right)$) is estimated by,

$$V(\hat{P}_S) = \left(\frac{6076}{32}\right)^2 \sum_{i=1}^{4} A_i^2 \frac{s_i^2}{n_i} \quad , \tag{5}$$

where,

$$s_i^2 = \sum_{j=1}^{n_i} \frac{\left(x_{ij} - \overline{x}\right)^2}{n_i - 1} \quad .$$

Ninety-five percent confidence bounds for the stratified biomass estimate will be approximated by,

$$\hat{P} \pm t_{(1-a/2,n-4)} SE \quad ,$$

where *SE* (standard error) is the square root of the variance.

Relative precision (RP) of the 95% confidence bounds is calculated for all estimates using,

$$RP = \frac{Upper\ bound - Lower\ bound}{\hat{P}} \quad . \tag{6}$$

D. Description of Study Area

The study will be conducted in Kachemak Bay, an embayment of Cook Inlet along the northern Gulf of Alaska (Figure 2). Habitat in this district is typified by mud or sand with occasional hard bottoms, particularly shale or coal. Depths are typically shallower than 35 fathom (64 m), although some areas exceed 90 fathom (165 m). This area is subject to high current flows and tidal fluctuations to 25 feet (46 m) and Kachemak Bay waters frequently contain glacial silt.

The survey design delineates Kachemak Bay into a grid of 1.0-nautical mile (nmi) squares (3.4-km^2). Survey stations were selected from the pool of potential stations with water depth greater than 20 fathom (36.6 m). The study design has remained relatively consistent throughout the survey time series except for station selection. Stations were historically selected at random from

the pool of potential stations. Since 1984, the survey design was changed to an index estimator with the same stations sampled each survey in an effort to reduce net damage.

E. Coordination and Collaboration with Other Efforts

This proposal builds upon current and previous GEM funded projects related to assessment of impacts resulting from the *Exxon Valdez* Oil Spill and information synthesis and data management. Data will be provided to other researchers examining linkages within the northern Gulf of Alaska ecosystem components. Of particular note are implications for studies being conducted by the Kachemak Bay Research Reserve and the U.S. Fish and Wildlife Service. Continued collection of species composition data will facilitate ecosystem modeling efforts by scientists in these and other agencies.

III. SCHEDULE

A. Project Milestones

Objective 1. Conduct a small-mesh bottom trawl survey of finfish and shellfish populations in Kachemak Bay.
To be met by May 2004

Objective 2. Compile data and prepare preliminary analyses.
To be met by November 2004

Objective 3. Distribute data and preliminary results to other researchers.
To be met by December 2004.

B. Measurable Project Tasks

FY 04, 1st quarter (October 1, 2003-December 31, 2003)
October: Project funding approved by Trustee Council

FY 04, 2nd quarter (January 1, 2004-March 31, 2004)
January 12-16 (tentative): Annual GEM Workshop
February 15: Complete gear preparation

FY 04, 3rd quarter (April 1, 2004-June 30, 2004)
May 15: Complete first season field work

FY 04, 4th quarter (July 1, 2004-September 30, 2004)
August 15: Preliminary data summary
September 1: Submit 2004 annual report

FY 05, 1st quarter (October 1, 2004-December 31, 2004)
November 15: Present data results at the American Fisheries Society, Alaska Chapter

FY 05, 2nd quarter (January 1, 2005-March 31, 2005)
(dates not yet known) Annual GEM Workshop
February 15: Complete gear repair and preparation

FY 05, 3rd quarter (April 1, 2005-June 30, 2005)
May 15: Complete second season field work

FY 05, 4th quarter (July 1,2005-September 30, 2005)
August 15: Preliminary data summary
September 1: Submit 2005 annual report

FY06, 1st quarter (October 1, 2005 – December 31, 2005)

FY06, 2nd quarter (January 1, 2006 – March 31, 2006)
(dates not yet known) Annual GEM Workshop
(dates not yet known) Attend Western Groundfish Conference

FY06, 3rd quarter (April 1, 2006 – June 30, 2006)
May 15: Complete third season field work

FY06, 4th quarter (July 1, 2006 – September 30, 2006)
August 15: Preliminary data summary
September 1: Submit 2006 annual report
September 15: Submit 2006 field data and draft final report to EVOS

IV. RESPONSIVENESS TO KEY TRUSTEE COUNCIL STRATEGIES

A. Community Involvement and Traditional Ecological Knowledge (TEK)

The fieldwork for this project, by virtue of involving day trips close to port, provides a unique opportunity for community involvement and participation in the study. The principal investigator will work with local educators in the biological sciences (Stan Eller, Advanced Science instructor at Homer High School and Carol Swartz, Director of the Kachemak Bay Campus-Kenai Peninsula College/University of Alaska Anchorage) to provide students some hands-on experience in the knowledge and understanding of species composition in the marine ecosystem of the northern Gulf of Alaska. All data being collected will also be made available, after preliminary processing, to the public and other Gulf of Alaska researchers.

B. Resource Management Applications

Data will be provided to ADF&G resource managers, particularly Charlie Trowbridge – ADF&G Homer and Nicky Szarzi – ADF&G Homer, and will be incorporated into management decisions affecting commercial, recreational, and subsistence fisheries for local shellfish and finfish resources. In particular, this data will supplement other ongoing surveys to provide indications of the status of, not only specific target species, but also of general ecosystem health. The small-mesh trawl used in this study also captures small and younger cohorts of target species than many other survey platforms currently used in the Kachemak Bay area. Thus, the data collected may prove useful for fisheries managers to better predict recruitment year-class strengths of actively managed shellfish of finfish. Data will also be provided to Carl Schoch and Scott Pegau, Kachemak Bay Research Reserve, for incorporation into oceanographic models for Kachemak Bay and upstream habitats, and to researchers as the U.S. Fish & Wildlife Service, such as Vernon Byrd, for input into seabird foraging models. Providing data to these individuals will facilitate ecosystem modeling with implications for multi-species management decisions by a variety of resource managers.

V. PUBLICATIONS AND REPORTS

A peer-reviewed publication is planned for the third year of this project. One possible title is journals is: "Decadal changes in the distribution and composition of Pandalid shrimp" in the Journal of Shellfish Research.

Annual and final reports will be provided to the GEM program office as required.

VI. PROFESSIONAL CONFERENCES

Participation in two conferences, in addition to the GEM annual meetings, is planned. In FY05, funds are requested to travel to the Alaska Chapter of the American Fisheries Society; the conference location is not yet known, but it typically occurs in November. In FY06 funds are requested to travel to the Western Groundfish Conference. The location of the conference is not currently known, but it is typically held in February or March at a west coast facility. At these meeting, we will present findings of the work conducted up to that time.

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Experiment in Prince William Sound and the Gulf of Alaska; Restoration project 96163L A-P, annual report.

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RESUME

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Alaska Department of Fish and Game, 3298 Douglas Place, Homer, AK 99603
Ph:907/235-8191; Fax: 907/235-2448; email: bill_bechtol@fishgame.state.ak.us

EDUCATION:	University of Alaska, Fisheries	1990 M.S.
	University of Washington, Wildlife	1979 B.S.

EMPLOYMENT:

ADF&G, Commercial Fisheries, Research Project Leader, 1995-present: Primary responsibilities include assessment and research of commercial groundfish and shellfish in Cook Inlet, Prince William Sound, and state waters of the Central Gulf of Alaska; design and implement surveys to assess crabs, groundfish, scallops, and clams using bottom and midwater trawl, longline, dredge, SCUBA (Local Dive Safety Officer), jig, acoustic, rake, and remotely operated vehicle (ROV) gears, coordination of onboard observer and port sampling programs; development of age-structured models; development of fisheries regulations and management plans. Currently serves on the Gulf of Alaska Groundfish Plan Team, North Pacific Fisheries Management Council, to review stock assessments and recommend allowable biological catch for groundfish resources managed under the Groundfish Fishery Management Plan for the Gulf of Alaska.

ADF&G, Commercial Fisheries, Regional Groundfish Biologist, 1989-1995: Primary responsibilities include research and management of commercial groundfish fisheries in Cook Inlet, Prince William Sound, and state waters of the Central Gulf of Alaska; design and implementation of port, trawl survey, and onboard observer sampling programs; herring egg deposition surveys in Prince William Sound using SCUBA; SCUBA surveys of log transfer facilities; development of fisheries regulations and management plans; (1984-1984) principally involved in design and implementation of jig, line transect, and mark-recapture surveys, including use of SCUBA, to assess pelagic and demersal rockfish resources along the outer Kenai Peninsula.

ADF&G, Fisheries Rehabilitation Enhancement and Development (FRED) Div., 1980-1989: Primary responsibilities included design and implementation of limnology surveys, particularly concerning juvenile sockeye rearing in barrier lake systems of lower Cook Inlet and the outer Kenai Peninsula; mark-recapture surveys to assess survival from different juvenile salmon rearing strategies; and aerial surveys to assess salmon escapements.

Fisheries Research Institute, 1979: Field technician in studies of side-scanning and upward-scanning hydroacoustic estimation of sockeye salmon escapement to the Kvichak River, Alaska.

American Fisheries Society - Alaska Chapter; Alaska Chapter President 1999-2000; Chapter Executive Committee, 1990-1992, 1998-2001; currently on Wally Noerenberg Committee and Past Presidents Committee; American Fisheries Society Certified Fisheries Scientist.

SELECTED PUBLICATIONS**:**

Bechtol, W.R. 2003. Assessment of weathervane scallops near Kayak Island, Alaska, 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A03-15, Anchorage.

Trowbridge, C.E., and W.R. Bechtol. 2003. Review of commercial fisheries for Dungeness crab, shrimp, and miscellaneous shellfish in Lower Cook Inlet: Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 2A03-09, Anchorage.

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Bechtol, W.R., and H. Yuen. 1995. Abundance and composition of flatfish in Kachemak Bay, Alaska. pp. 497-521 In: Proceedings of the International Symposium on North Pacific Flatfish, Alaska Sea Grant Report 95-04, Fairbanks.

COLLABORATIONS OVER THE PAST FOUR YEARS:

Dr. George W. Benz - Tennessee Aquarium and Tennessee Aquarium Research Institute
Robert S. Berceli – Alaska Department of Fish and Game
L. Brannian – Alaska Department of Fish and Game
Michael Byerly – Alaska Department of Fish and Game
J. DiCosimo – North Pacific Fishery Management Council
William Dunne – Alaska Department of Fish and Game
Dr. Aaron Fisk - University of Georgia
Dr. Anthony J. Gharrett - University of Alaska
Dr. Kenneth J. Goldman - California State University Long Beach
Richard L. Gustafson – Alaska Department of Fish and Game
Morris. A. Lambdin – Alaska Department of Fish and Game
Scott Meyer– Alaska Department of Fish and Game
Dr. Carl Schoch – ADF&G, Kachemak Bay Research Reserve
Nicole Szarzi – Alaska Department of Fish and Game
Dr. Gary L. Thomas – (formerly) Prince William Science Center
Dr. Richard E. Thorne - Prince William Science Center
Charlie Trowbridge – Alaska Department of Fish and Game

BUDGET JUSTIFICATION

The core project expenses are for the fieldwork involving a small-mesh trawl survey in Kachemak Bay, Alaska. Compared to many surveys, project expenses are low for the 9-days of field work because the survey occurs as "day trips" with the survey crew departing from and returning to Homer, Alaska each day. This reduces vessel expenses, shown here as vessel charter costs. This also allows the survey to optimize fishing opportunities by excluding bad weather days from the survey period. Personnel partially funded through the project include two project biologists and one project technician, all involved with gear preparation, fieldwork, data entry, and data analyses. The principal investigator is funded through ADF&G general funds. Additional personnel, primarily technicians associated with the fieldwork, are also funded through existing ADF&G general funds. In addition to personnel and vessel costs, the FY04 request includes the purchase of a thermosalingraph. This unit will be installed aboard the research vessel *Pandalus* to collect surface temperature and salinity data as part of all survey work conducted during the calendar year. The *Pandalus* sails approximately 150 days annually, conducting a wide range of surveys along the northern Gulf of Alaska from Yakutat Bay to Shelikof Strait.

Given the decline in the shrimp population, compounded by a declining department operating budget amid increasing demands for assessment and management of other resources, the Kachemak Bay small-mesh trawl survey was reduced to a biennial and then a triennial survey frequency. This survey still represents one of the few long-term data sets for the Northern Gulf of Alaska. Although ADF&G recognizes the utility of this survey as a tool to monitor general ecosystem health, particularly if links can be established among ecosystem components in ways that allow a priori estimation of ecosystem changes, this survey is no longer views as a priority agency responsibility. Supplemental funding is needed to provide the data for long-term monitoring of ecosystem health in the northern Gulf of Alaska

FY04 Details – Total request of $51.1k. The request of $22.3k for personnel is matched by non-EVOS contribution of $20.8k for project oversight and fielding of staff for the survey crew. Contractual expenses include vessel charter costs, the costs to transport a shrimp net to the National Marine Fisheries Service net loft in Seattle for repair and standardization, and $1.5k for the installation of the Thermosalinograph shown as a new equipment purchase.

FY05 Details – Total request of $49.2k. The request of $25.4k for personnel is matched by non-EVOS contribution of $21.1k for project oversight and fielding of staff for the survey crew. Contractual expenses include vessel charter costs and the costs to transport a shrimp net to the National Marine Fisheries Service net loft in Seattle for repair and standardization. Travel includes making a presentation at the parent society meeting of the American Fisheries Society.

FY06 Details – Total request of $51.1k. The request of $25.9k for personnel is matched by non-EVOS contribution of $21.6k for project oversight and fielding of staff for the survey crew. Contractual expenses include vessel charter costs and the costs to transport a shrimp net to the National Marine Fisheries Service net loft in Seattle for repair and standardization. Travel includes making a presentation at the Western Groundfish Conference.

DATA MANAGEMENT AND QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

Specific details of the project sampling are further described above under catch sampling and data analyses. Total sample size will involve approximately 30 tows of a small-mesh, bottom trawl for a distance of 1.0 nautical mile. If complications are encountered during a tow, data will only be retained if: (1) the gear is deemed to have fished effectively (e.g., doors did not cross); (2) the trawl did not incur significant rips during the tow; and (3) tow distance was at least 0.6 nautical mile. Data collection will be a combination of physical data, species-specific data, and taxonomic data. Survey data will include two basic categories: (1) vessel haul data and (2) catch data.

During each tow, the vessel captain will record the following vessel haul data: sequential tow identification number, alphanumeric station code, date, starting location (latitude and longitude), stop location (latitude and longitude), course made good, vessel speed, tow start, tow stop time, distance towed, maximum depth, minimum depth, sea conditions, amount of trawl cable deployed, and gear performance. A thermosaligraph will also allow the collection of temperature and salinity data at the tow location and also at other transited areas.

For each species or major species group represented in the tow catch, the following data will be recorded: catch weight, catch abundance, and whether the recorded catch represents the entire catch or a subsample of the catch. In addition, commercially important species will be further sampled for individual size and age.

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Budget Category:	Proposed FY 04	Proposed FY 05	Proposed FY 06		TOTAL PROPOSED
Personnel	$22.3	$25.4	$25.9		$73.6
Travel	$0.6	$1.4	$1.7		$3.7
Contractual	$18.5	$17.3	$18.3		$54.1
Commodities	$1.0	$1.0	$1.0		$3.0
Equipment	$4.5	$0.0	$0.0		$4.5
Subtotal	$46.9	$45.1	$46.9		$138.9
General Administration (9% of Subtotal)	$4.2	$4.1	$4.2		$12.5
Project Total	$51.1	$49.2	$51.1		$151.4

Cost-share Funds:

FY04 - $20.8k Total contribution from ADF&G general funds
$10.1k - Bechtol, F.B. III - Principal Investigator - funded for 1.5 months
$3.5k - Trowbridge, FB III, management biologist - funded for 0.5 months
$7.2k - Three technicians - funded an aggregate of 2.0 months for field work and gear prep

FY05 - $21.1k Total contribution from ADF&G general funds
$10.1k - Bechtol, F.B. III - Principal Investigator - funded for 1.5 months
$3.6k - Trowbridge, FB III, management biologist - funded for 0.5 months
$7.4k - Three technicians - funded an aggregate of 2.0 months for field work and gear prep

FY06 - $21.6k Total contribution from ADF&G general funds
$10.4k - Bechtol, F.B. III - Principal Investigator - funded for 1.5 months
$3.6k - Trowbridge, FB III, management biologist - funded for 0.5 months
$7.6k - Three technicians - funded an aggregate of 2.0 months for field work and gear prep

FY 04-06

Date Prepared:

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3A
TRUSTEE
AGENCY
SUMMARY

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
Byerly - FB II	Project Biologict	16 B	3.0	4.8	0.0	14.4
Armstrong - F&WT II	Project Technician	9 D	1.0	2.7	0.0	2.7
Gustafson - FB I	Project Biologist	14 K	1.0	5.2	0.0	5.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		5.0	12.7	0.0	
					Personnel Total	$22.3

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Bechtol, Hom-Anc, EVOS Meeting	0.3	1	3	0.1	0.6
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$0.6

FY 04

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Contractual Costs:	Contract Sum
Description	
Vessel Charter - 9 d @ 1.5 K/d	13.5
Net Repair & Transport	3.5
Thermosalinograph Installation	1.5
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$18.5

Commodities Costs:	Commodity Sum
Description	
CLOTHING/PERSONAL PROTECTION GEAR	0.3
OFFICE SUPPLIES	0.2
SCIENTIFIC SUPPLIES	0.5
Commodities Total	$1.0

FY 04

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Contractual
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Commoditie

New Equipment Purchases:	Number	Unit	Equipment
Description	of Units	Price	Sum
Thermosalinograph (cost from Internet search)	1	4.5	4.5
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$4.5

Existing Equipment Usage:	Number	Inventory
Description	of Units	Agency
High-rise Shrimp Trawl	4	ADF&G

FY 04

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
Byerly - FB II	Project Biologict	16 C	3.5	5.0	0.0	17.5
Armstrong - F&WT II	Project Technician	9 D	1.0	2.7	0.0	2.7
Gustafson - FB I	Project Biologist	14 K	1.0	5.2	0.0	5.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		5.5	12.9	0.0	
					Personnel Total	$25.4

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Bechtol, Hom-Anc, EVOS Meeting	0.3	1	3	0.1	0.6
					0.0
Bechtol, Hom-Anc, American Fisheries Society	0.3	1	5	0.1	0.8
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.4

FY 05

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Contractual Costs:	Contract Sum
Description	
Vessel Charter - 9 d @ 1.5 K/d	13.5
Net Repair & Transport	3.5
AFS Conference Registration	0.3
If a component of the project will be performed under contract, the 4A and 4B forms are required. **Contractual Total**	$17.3

Commodities Costs:	Commodity Sum
Description	
CLOTHING/PERSONAL PROTECTION GEAR	0.3
OFFICE SUPPLIES	0.2
SCIENTIFIC SUPPLIES	0.5
Commodities Total	$1.0

FY 05

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Contractual
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Commoditie

New Equipment Purchases:	Number of Units	Unit Price	Equipment Sum
Description			
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
			0.0
		New Equipment Total	$0.0

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		
High-rise Shrimp Trawl	4	ADF&G

FY 05

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Equipment
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Personnel Costs:		GS/Range/	Months	Monthly		Personnel
Name	Description	Step	Budgeted	Costs	Overtime	Sum
Byerly - FB II	Project Biologict	16 D	3.5	5.1	0.0	17.9
Armstrong - F&WT II	Project Technician	9 E	1.0	2.8	0.0	2.8
Gustafson - FB I	Project Biologist	14 K	1.0	5.2	0.0	5.2
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
						0.0
	Subtotal		5.5	13.1	0.0	
					Personnel Total	$25.9

Travel Costs:	Ticket	Round	Total	Daily	Travel
Description	Price	Trips	Days	Per Diem	Sum
Bechtol, Hom-Anc, EVOS Meeting	0.3	1	3	0.1	0.6
					0.0
Bechtol, (location not announced yet) Western Groundfish Conference	0.6	1	5	0.1	1.1
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
					0.0
				Travel Total	$1.7

FY 06

Project Number:
Project Title: Monitoring Ecosystem Parameters in the Northern Gulf of Alaska
Agency: Alaska Department of Fish and Game

FORM 3B
Personnel
& Travel
DETAIL

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
DETAILED BUDGET FORM FY 04 - FY 06

Contractual Costs:	Contract Sum
Description	
Vessel Charter - 9 d @ 1.5 K/d	13.5
Net Repair & Transport	3.5
Western Groundfish Conf. Registration	0.3
Manuscript Publication Costs (see proposal text)	1.0
Contractual Total	$18.3

Commodities Costs:	Commodity Sum
Description	
CLOTHING/PERSONAL PROTECTION GEAR	0.3
OFFICE SUPPLIES	0.2
SCIENTIFIC SUPPLIES	0.5
Commodities Total	$1.0

FY 06

Project Number:
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FORM 3B
Contractual
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Commoditie

New Equipment Purchases:		Number of Units	Unit Price	Equipment Sum
Description				
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
				0.0
			New Equipment Total	$0.0

Existing Equipment Usage:	Number of Units	Inventory Agency
Description		
High-rise Shrimp Trawl	4	ADF&G

FY 06

Project Number:
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FORM 3B
Equipment
DETAIL